

**REMARKS**

The present application includes claims 1, 4-9, 11-14 and 17-23, claims 2-3, 10, and 15-16 being previously cancelled. The Office Action of January 23, 2009 rejected all claims. Claims 1, 9 and 14 are hereby amended. Applicants request reconsideration of the claims in light of the discussion below.

Claims 1, 7, 9, 11 and 14 were rejected under 35 U.S.C. § 103(a) as obvious based on the combination of Kawagishi (U.S. Patent No. 6,663,565) and Napolitano et al (U.S. Patent No. 6,193,663).

Claims 4, 8, 12 and 17-19 were rejected under 35 U.S.C. 103(a) as obvious based on the combination of Kawagishi (U.S. Patent No. 6,663,565), Napolitano et al (U.S. Patent No. 6,193,663) and Phillips (U.S. Patent No. 6,213,947).

Claims 5, 6, 13 and 20-23 were rejected under 35 U.S.C. 103(a) as obvious based on the combination of Kawagishi (U.S. Patent No. 6,663,565), Napolitano et al (U.S. Patent No. 6,193,663), Phillips (U.S. Patent No. 6,213,947) and Chiao (U.S. Patent No. 5,984,869).

The present application includes three independent claims, 1, 9 and 14. As amended herein, each of the independent claims reflect that signals (for example, ultrasound beams or waveforms) encoded with complementary Golay codes are

transmitted on **spatially adjacent paths in a single transmission**. The present amendments are fully supported in the application as originally filed and do not include new matter. See, for example, paragraph 37 of the application as filed.

Transmission on **spatially adjacent paths in a single transmission**, as opposed to the same path, can provide an improvement over known systems that transmit on the same path. For example, transmitting on the same path requires two separate transmissions, increasing the time required to obtain data. Also, double transmission can degrade a frame rate of an imaging system.

The Office Action at page 3 notes that Kawagishi does not expressly teach transmission on spatially adjacent paths. Indeed, Kawagishi discloses a system that can compensate for tissue motion in an observed object between a first ultrasound transmission and a second ultrasound transmission. The tissue motion occurs during a **time difference** between the first and second transmissions. The time difference results from the first and second transmissions being transmitted in the **same direction**. See, for example, Kawagishi, 1:64-2:25, 5:23-61.

However, Kawagishi does not disclose signals (for example, ultrasound beams or waveforms) encoded with complementary Golay codes being transmitted on **spatially adjacent paths in a single transmission**, as recited in the present claims. In fact, because Kawagishi teaches a system where first and second

transmissions are transmitted in the **same direction**, Kawagishi teaches away from the claimed inventions.

Napolitano discloses a diagnostic ultrasound imaging method and system with improved frame rate wherein first and second transmit beams can be adjacent. See, e.g., Napolitano, Title, 4:17-29. Napolitano also discloses varying transmission codes, such as Golay codes, in **successive transmit events**. Specifically, Napolitano states:

#### Alternating Line Transmit Code Embodiments

As described in co-pending U.S. patent application Ser. No. 09/283,346, filed on the same date as the present application, multiple transmit codes can be used on **successive transmit events**. Related co-pending U.S. patent application Ser. No. 09/282,510 provides further information on coded transmit beams. The entirety of these two co-pending U.S. patent applications are hereby incorporated by reference for their teaching of such transmission codes. As explained in greater detail in this application, such transmit codes include transmit phase modulation codes and transmit amplitude modulation codes.

By varying the transmission code **from transmit event to transmit event**, the shape of the transmit pulse can be changed in such a way that the echo signals from transmit events with differing transmit codes have markedly different range lobes. By coherently combining echo signals having differing range lobes, undesired range lobes can be reduced or cancelled to a large extent. Examples of suitable codes that can be varied **from transmit event to transmit event** include frequency modulated codes and Golay codes. Frequency modulated codes include a wide variety of transmit pulses in which the zero crossings are unevenly spaced. Chirp pulses (of either the rising frequency or falling frequency type) are two examples.

Napolitano, 13:26-50 (emphases added). Napolitano, therefore discloses varying Golay codes in **successive transmit events**.

However, Napolitano does not disclose signals (for example, ultrasound beams or waveforms) encoded with complementary Golay codes being transmitted on **spatially adjacent paths in a single transmission**, as recited in the present claims. In fact, because Napolitano teaches varying Golay codes in **successive transmit events**, Napolitano teaches away from the claimed inventions.

Napolitano also generally indicates that “multiple simultaneous transmit beam techniques can be used with these embodiments.” Napolitano, 14:3-4. However, such a general statement does not change that Napolitano specifically teaches varying Golay codes in **successive transmit events** as opposed to **a single transmission**, as recited in the claims.

The other cited references (Philips and Chiao) also do not disclose signals (for example, ultrasound beams or waveforms) encoded with complementary Golay codes being transmitted on **spatially adjacent paths in a single transmission**, as recited in the present claims. Rather, these references also disclose **multiple transmission** systems, and therefore teach away from the claimed inventions.

As discussed above, none of the cited references teach or suggest signals (for example, ultrasound beams or waveforms) encoded with complementary Golay

codes being transmitted on **spatially adjacent paths in a single transmission**, as recited in the present claims. Further, to extent the cited references teach first and second transmissions in the **same direction** and/or in **successive transmissions**, the references teach away from the claimed inventions, which recite transmission on **spatially adjacent paths in a single transmission**. The cited references should not be modified to arrive at the claimed inventions because doing so would change the principle of operation of the disclosed systems. The MPEP states:

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious.

MPEP § 2143.01. Modifying a system that provides first and second transmissions in the **same direction** and/or in **successive transmissions** such that it transmits on **spatially adjacent paths in a single transmission** would indeed change the principle of operation of such a system.

For at least the foregoing reasons the cited references, whether taken alone or in combination, cannot anticipate or render obvious independent claims 1, 9 or 14 or claims that depend therefrom. Applicants submit therefore that the pending claims are directed to patentable subject matter.

### **CONCLUSION**

Applicants submit that the pending claims are in condition for allowance. If the Examiner has any questions or the Applicants can be of any assistance, the

Examiner is invited to contact the Applicants undersigned attorney at 312-775-8096

In general, the Office Action makes various statements regarding the pending claims and the cited references that are now moot in light of the above. Thus, Applicants will not address such statements at the present time. Applicants expressly reserve the right, however, to challenge such statements in the future should the need arise (e.g., if such statements should become relevant by appearing in a rejection of any current or future claim). Applicants incorporate by reference the remarks made in the response filed October 6, 2008.

The Commissioner is authorized to charge any additional fees or credit overpayment to the Deposit Account of GEMS-CS, Account No. 502401.

Respectfully submitted,

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